The role of memory in CSWL: Memory flush in memory buffer (MBP) – 4 object (#110019)

Author(s)
This pre-registration is currently anonymous to enable blind peer-review.
It has 2 authors.

Pre-registered on:
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1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
In this study, we examine the role of memory in cross-situational word learning. Specifically, we propose a mechanism that limits the number of words that are learned concurrently: a memory buffer of a fixed size, containing the set of word meanings being actively learned, is separated from the lexicon, where learned word-object associations are stored. For more detail, refer to Soh & Yang, 2021.

We predict that words in the memory buffer are susceptible to removal when new words are encountered (while those in the lexicon are not affected). To test this, we will manipulate words to be stored in the learner's memory buffer (by virtue of being verified at most twice during learning) in different testing blocks such that with one block, testing occurs directly after the learning trials, and in the other block, the participant encounters many new words prior to testing.

The word learning task has 4 blocks. The first block is a warm-up, in which participants are exposed to 10 words with a single exposure each. The second and fourth blocks (the target blocks) each have 4 new words presented with 3 exposures each, and the third block has 10 words (the same as in the warm-up) presented with 2 exposures each (the "memory flush"–a set of new words to replace words in the memory buffer). The warm-up allows the two target blocks to be more comparable.

Following the learning task, participants are tested on all words in reverse block order with a forced choice task with 9 options. We specifically predict that for words encountered in the second block (pre-flush), performance will be lower than for those encountered in the fourth block (post-flush).

3) Describe the key dependent variable(s) specifying how they will be measured.
Word learning accuracy on primary task blocks: performance at test on words encountered in the primary task's target word-learning blocks (specifically, whether the learner selects the image that always co-occurred with the word).

4) How many and which conditions will participants be assigned to?
This is a within-participant design, and the manipulation of interest is the block in which the word appeared. We will compare the two blocks (pre-flush and post-flush).

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We will be analyzing within-participant effects. Our primary analysis will be on the word learning accuracy on the primary task blocks. We will perform a binomial mixed effect regression on accuracy with block as the main effects and with participant and item as random effects, with random slopes when possible and appropriate. The effect of primary interest is the main effect.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
Only words that had the corresponding image selected at least once by the subject will be included in the analysis. Additionally, if the subject selected an object for 2 different word meanings, then those two words will be excluded.

Participants will be asked at the end of the experiment if there is any reason their data should be excluded (e.g., they cheated or experienced technical difficulties), and we will exclude those who report their data should be discarded.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We plan to test 40 participants on Prolific.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
We will in addition perform a selectional analysis. We will compare the number of tokens for which participants posited 2 unique hypotheses vs. 3 unique hypotheses (i.e. objects selected at the learning exposures) and compare performance on object hypotheses that were selected once vs. twice at learning.

We will also conduct secondary analyses testing whether participants at test will select objects that they selected in the learning exposures.